WHAT IS CLAIMED IS:

1. A branching endoluminal prosthesis for use in a branching body lumen system which includes a trunk lumen and first and second branch lumens, the prosthesis comprising;

a radially expandable tubular trunk portion having a prosthetic trunk lumen;

radially expandable tubular first and second branch portions with first and second prosthetic branch lumens; and

a radially expandable tubular lumen separation portion which provides fluid communication between the prosthetic trunk lumen and the first and second prosthetic branch lumens;

wherein the expanded trunk portion is more axially flexible than the expanded lumen separation portion.

2. A branching endoluminal prosthesis as in claim 1, wherein the prosthetic trunk lumen and the first and second prosthetic branch lumens adjacent the lumen separation portion define a branch plane, and wherein the trunk portion has greater axial flexibility roughly perpendicular to the branch plane than the lumen separation portion.

3. A branching endoluminal prosthesis as in claim 2, further comprising a trunk sealing cuff on the trunk portion generally opposite the lumen separation to seal between the prosthetic trunk lumen and the trunk lumen of the body lumen system.

4. A branching endoluminal prosthesis as in claim 3, wherein the trunk portion is more axially flexible than the trunk sealing cuff.

5. A branching endoluminal prosthesis as in claim 1, wherein at least a portion of the first and second branch portions are more axially flexible than the lumen separation portion.

6. A branching endoluminal prosthesis as in claim 5, further comprising branch sealing cuffs on the first and second branch portions generally opposite the lumen separation to seal between the prosthetic branch lumens and the branch lumens of the body lumen system.

7. A branching endoluminal prosthesis as in claim 6, wherein the branch portions are more axially flexible than the trunk sealing cuffs.

8. A branching endoluminal prosthesis as in claim 1, wherein at least one of the trunk portion and the first and second branch portions comprises a liner supported by a helical coil defining a plurality of separated loops to enhance axial flexibility, and wherein the helical coil elongates during expansion of the liner to avoid unwinding of the coil relative to the liner.

9. A branching endoluminal prosthesis for use in a branching body lumen system which includes a trunk lumen and first and second branch lumens, the prosthesis comprising;

a radially expandable tubular trunk portion having a prosthetic trunk lumen;

radially expandable tubular first and second branch portions with first and second prosthetic branch lumens;

a radially expandable tubular lumen separation portion between the first and second branch portions and the trunk portion to provide fluid communication between the prosthetic trunk lumen and the first and second prosthetic branch lumens; and

sealing cuffs on the trunk portion and the first and second branch portions generally opposite the lumen separation to seal between the prosthetic lumens and the lumens of the body lumen system;

wherein the expanded branch portions and trunk portion are more axially flexible than the expanded lumen separation portion.

10. An endoluminal prosthesis comprising:

a first prosthesis portion including a first radially expandable frame which defines a first axis, the first frame supporting a first tubular liner having a first lumen;

a second prosthesis portion including a second radially expandable frame which defines a second axis, the second frame supporting a second tubular liner having a second lumen; and

a flexible joint between the first and second prosthesis portions to accommodate angles between the first and second axes, wherein the flexible joint comprises a self supporting polymer tube having integral ribs.

11. An endoluminal prosthesis as in claim 10, wherein the self-supporting liner comprises a PTFE tube which extends between the first and second liners.

12. An endoluminal prosthesis as in claim 10, wherein the first and second frames comprise resilient structures.

13. An endoluminal prosthesis as in claim 10, wherein the first and second portions have substantially higher column strength and hoop strength than the flexible joint.

14. An endoluminal prosthesis comprising:

a first prosthesis portion including a first radially expandable frame which defines a first axis, the first frame supporting a first tubular liner having a first lumen;

a second prosthesis portion including a second radially expandable frame which defines a second axis, the second frame supporting a second tubular liner having a second lumen; and

a flexible joint between the first and second prosthesis portions to accommodate angles between the first

and second axes, wherein the flexible joint comprises a tubular joint liner supported by a plurality of reinforcing elements, the reinforcing elements comprising roughly cylindrical segments disposed axially along the joint liner so as to slide relative to each other during radial expansion.

15. An endoluminal prosthesis as in claim 14, wherein the reinforcing elements comprise corrugated polyester.

16. An endoluminal prosthesis as in claim 14, wherein the reinforcing elements comprise corrugated PTFE.

17. An endoluminal prosthesis as in claim 14, wherein the joint liner comprises an expansible material.

18. An endoluminal prosthesis comprising:

a plastically expansible tubular liner having a lumen which defines an axis; and

a helical coil supporting the liner, the coil defining a plurality of loops, wherein the loops are separated to enhance axial flexibility of the prosthesis, and wherein the helical coil elongates during plastic expansion of the liner to avoid unwinding of the coil relative to the liner.

19. An endoluminal prosthesis as in claim 18, wherein the liner comprises a polymer tube having integral ribbing disposed between the separated loops of the coil.

20. An endoluminal prosthesis as claimed in claim 18, wherein the coil is attached to the liner at a plurality of attachment points along the length of the coil.

21. An endoluminal prosthesis as claimed in claim 17, wherein the coil comprises linked diamond-shaped elements.

22. An endoluminal prosthesis as claimed in claim 17, wherein the liner comprises partially oriented or

unoriented polyester fiber, the fiber being circumferentially oriented.

23. An endoluminal prosthesis as claimed in claim 18, wherein the coil comprises a shape memory alloy or a shape memory polymer.

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24. An endoluminal prosthesis for use in a bent body lumen, the prosthesis comprising a radially expandable tubular frame defining an axis, the frame including a plurality of resiliently expandable loops and a plurality of plastically deformable connector elements extending between adjacent loops which allow the axis to plastically conform to the body lumen.

25. An endoluminal prosthesis as in claim 24, wherein the connector elements plastically deform at a predetermined load which is greater than physiological loads imposed on the deployed prosthesis by the surrounding body lumen.

26. An endoluminal prosthesis as in claim 25, wherein the predetermined load is less than or equal to loads imposed on the prosthesis during deployment of the prosthesis within the body lumen.

27. An endoluminal prosthesis as in claim 24, wherein the adjacent loops are axially separated, and wherein the connector elements comprise serpentine structures which extend axially between the adjacent loops.

28. An endoluminal prosthesis as in claim 24, wherein the loops comprise ring-frames.

29. An endoluminal prosthesis as in claim 28, further comprising a tubular liner supported by the ring frames and the connector elements.

30. An endoluminal prosthesis as in claim 24, wherein an attachment mechanism allows a limited axial motion between at least some connector elements and an associated loop without deforming the connector elements.

31. A bifurcated endoluminal prosthesis for use within a branching body lumen system having a trunk lumen and first and second branch lumens, the trunk lumen having a larger cross-section than the branch lumens, the trunk and branch lumens in fluid communication at a lumenal intersection, the prosthesis comprising:

a hub module which is deployable within the body lumen system adjacent the lumenal intersection; and

a tubular trunk module having a first port which sealingly engages the hub module when radially expanded therein, an end opposing the first port which seals radially against the surrounding trunk lumen opposite the hub module, and a trunk lumen therebetween.

32. A bifurcated endoluminal prosthesis as in claim 31, wherein the hub module includes a trunk lumen port in which the first port of the trunk module is sealingly engageable, and first and second branch lumen ports which are extendable into the first and second branch lumens of the body lumen system so as to promote sealing therewith.

33. A bifurcated endoluminal prosthesis as in claim 32, wherein a portion of the hub between the trunk lumen port and at least one of the first and second branch ports has enhanced axial flexibility.

34. A bifurcated endoluminal prosthesis as in claim 32, further comprising a radially expandable branch module having an end which sealingly engages the deployed first branch port and extends along the branch lumen of the body lumen system from the lumenal intersection.

35. A bifurcated endoluminal prosthesis as in claim 31, wherein the hub module comprises a molded tubular expandable body so that a trunk port and branch ports substantially match the trunk lumen and first and second branch lumens of a particular patient's body lumen system.

36. A bifurcated endoluminal prosthesis for use within a branching body lumen system having a trunk lumen and first and second branch lumens, the trunk lumen having a larger cross-section than the branch lumens, the trunk and branch lumens in fluid communication at a lumenal intersection, the prosthesis comprising:

a branch module having a first branch end which is deployable within the first branch of the body lumen system, a second branch end which is extendable from the first branch end across the lumenal intersection to the second branch of the body lumen system, a prosthetic branch lumen therebetween, and a trunk port between the first and second branch ends; and

a tubular trunk module having a first end which is sealingly engageable to the branch module, a second end opposing the first end which seals radially against the surrounding trunk lumen of the body lumen system, and a prosthetic trunk lumen therebetween.

37. A bifurcated endoluminal prosthesis as claimed in claim 36, wherein the first end of the trunk module sealingly engages the trunk port of the branch module when deployed therein.

38. A bifurcated endoluminal prosthesis as claimed in claim 37, wherein the branch and trunk modules engage so as provide a predetermined flow split from the trunk module to the first and second branch ends of the branch module.

39. A bifurcated endoluminal prosthesis as claimed in claim 36, wherein the trunk lumen has a larger cross-section than the lumen of the branch module adjacent the first or second branch ends.

40. A bifurcated endoluminal prosthesis for use within a branching body lumen system having a trunk lumen and first and second branch lumens, the trunk lumen having a larger cross-section than the branch lumens, the trunk and branch lumens in fluid communication at a lumenal intersection, the prosthesis comprising:

a primary module which is deployable within the body lumen system adjacent the lumenal intersection; and

a tubular trunk module having a first port which is supported at least in part by the deployed primary module when radially expanded therein, an end opposing the first port which seals radially against the surrounding trunk lumen opposite the primary module, and a trunk lumen therebetween.

41. A bifurcated endoluminal prosthesis as in claim 40, wherein the primary module comprises a spacer having a trunk module support surface and a branch engagement surface, and wherein the trunk module support surface supports the expanded trunk module relative to the branch engagement surface within the body lumen system.

42. A bifurcated endoluminal prosthesis as in claim 40, wherein the primary module comprises a tapered body which tapers outward from a first end to a second end opposite the trunk module, and further comprising at least one branch module which expands radially to engage a branch port adjacent the second end of the tapered body.

43. A bifurcated endoluminal prosthesis as claimed in claim 40, wherein the primary module comprises a radially expandable tubular first branch module which supports the trunk module from within the first branch lumen of the body lumen system, wherein the trunk module comprises a bifurcated prosthetic module having a second branch portion disposable adjacent the first port.

44. A bifurcated endoluminal prosthesis comprising:

a radially expandable trunk portion having a trunk lumen and a branch end;

radially expandable first and second branch portions extending from the branch end of the trunk portion, the branch portions having first and second branch lumens, the first and second branch lumens being in fluid communication with the trunk lumen of the trunk portion;

wherein at least one of the branch portions is compressible within the trunk portion, and wherein the at least one branch portion is extendable from the expanded trunk portion *in situ*.

45. A method for deploying an endoluminal prosthesis in a branching body lumen system which includes a trunk lumen and first and second branch lumens, the trunk lumen and branch lumens in fluid communication at a lumenal intersection, the trunk lumen being larger in cross-section than the first and second branch lumens, the method comprising:

deploying a primary module within the body lumen system adjacent the lumenal intersection so that a trunk port of the primary module extends along the trunk lumen; and

expanding a trunk module within the trunk lumen while an end of the trunk module is within the trunk port of the primary module so that the primary module engages and supports the trunk module from adjacent the lumenal intersection.

46. A method as in claim 45, wherein the deploying step comprises expanding a tubular hub module so that first and second branch ports extend along the first and second branch lumens of the body lumen system.

47. A methods as in claim 46, further comprising selecting a hub module which approximately matches a geometry of a particular patients branching body lumen system adjacent the lumenal intersection.

48. A method as in claim 46, further comprising molding a hub module to match a geometry of a particular patients branching body lumen system adjacent the lumenal intersection.

49. A method as in claim 46, further comprising expanding a branch module within the first branch port of the hub module.

50. A method for deploying an endoluminal prosthesis in a branching body lumen system which includes a trunk lumen and first and second branch lumens, the trunk lumen and branch lumens in fluid communication at a lumenal intersection, the method comprising:

positioning a tubular prosthetic branch module across the lumenal intersection from the first branch into the second branch, wherein a common lumen port of the branch prosthesis module is adjacent to the lumenal intersection;

expanding the positioned branch module;

positioning a tubular common lumen module within the common lumen of the body lumen system with at least one opening adjacent the lumenal intersection; and

expanding the positioned common lumen module;

wherein expansion of the later of the branch module and the common lumen module sealingly engages the branch and common lumen modules.

51. A method as in claim 50, further comprising inserting the branch module through first and second openings of the expanded common lumen module.

52. A method as in claim 50, further comprising inserting the common lumen module into the common lumen port of the expanded branch lumen module.

53. A method as in claim 50, wherein the common lumen comprises the abdominal aorta, wherein the first and second branch lumens comprise the left and right iliac

arteries, and wherein the sealingly engaged prosthetic modules extend upstream and downstream beyond an aneurysm.

54. A method for deploying an endoluminal prosthesis in a branching body lumen system of a patient, the branching lumen system including first, second, and third lumens in fluid communication at a lumenal intersection, the method comprising:

positioning the first wire through the lumenal intersection by introducing the first wire in through the first lumen and out the second lumen;

threading a distal end of the first wire through a distal opening of a second wire; and

selectively tensioning proximal and distal ends of the first wire and the proximal end of the second wire to position the prosthesis adjacent to the intersection.

55. A method as in claim 54, further comprising:

returning the threaded first wire through the intersection and outside the patient; and

advancing the distal end of the second wire toward the intersection by tensioning the proximal and distal ends of the first wire.

56. A method as in claim 55, wherein the returning step comprises advancing the threaded first wire back along the second lumen to the intersection and out of the patient through the third lumen.

57. A method for producing an endoluminal prosthesis comprising:

attaching an axially compressible elongate structure to an elongate liner strip;

coiling the liner strip to from a helix having a plurality of loops; and

attaching adjacent loops together so that the liner defines a tube.

58. A sealing structure for sealing an end of a tubular endoluminal prosthesis against a surrounding lumen, that sealing structure comprising a plurality of flexible sealing flaps extending from the prosthesis adjacent the end, the sealing flaps resiliently flaring radially outward to independently seal against the surrounding lumen.

59. An endoluminal prosthesis comprising:

a tubular liner; and

a frame supporting the tubular liner, the frame defining a plurality of loops having axially oriented apices, wherein at least some of the adjacent apices of adjacent loops are offset to enhance axial flexibility of the prosthesis.